REMARKS/ARGUMENTS

Applicants appreciate the thorough review of the present application as evidenced by the Official Action. Applicants also appreciate the indication that Claims 2-4, 16-18, 30, 31, 33, and 36, 37, 39, and 40 would be allowable if rewritten in independent form. However, please clarify the status of Claim 38 as paragraph 5 of the Official Action rejects Claim 38 while paragraph 6 indicates that Claim 38 is allowable. The Official Action rejected Claims 1, 5, 7-15, 19, 20-28 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,571,171 to Pauly in view of U.S. Patent No. 6,163,744 to Onken et al. The Official Action rejected Claims 10-13 and 24-27 under 35 U.S.C. § 103(a) as being unpatentable over the Pauly '171 patent in view of the Onken '744 patent and further in view of U.S. Patent No. 5,657,231 to Nobe et al. The Official Action rejected Claims 14 and 28 under 35 U.S.C. § 103(a) as being unpatentable over the Pauly '171 patent in view of the Onken '744 patent and further in view of U.S. Patent No. 6,216,109 to Zweben et al. The Official Action rejected Claims 29, 32, 34-36 and 38 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,943,919 to Aslin in view of the Onken '744 patent.

As explained more fully below, independent Claims 1, 15, 29, and 35 have been amended to further patentably distinguish the cited references, taken either individually or in combination. In light of the foregoing amendments and the subsequent remarks, Applicants respectfully request reconsideration and allowance of the present application.

A. The Rejections of Claims 1, 5-15, and 19-28 under 35 U.S.C. § 103(a) are Overcome

The Pauly '171 patent discloses an apparatus and method for inserting a waypoint into a preexisting flight plan, which includes selecting a waypoint on a Flight Management System (FMS) graphical display of a portion of the flight plan and automatically generating a proposed changed flight plan. See Abstract. Thus, once a pilot has selected waypoint 201 in the display of Figure 2, the pilot is given an option of inserting the waypoint 201 into the flight plan by clicking the insert button 204. The display of Figure 3 is then shown. The newly inserted waypoint 201

is shown to be inserted in first leg 106 and proposed new legs 302 and 304 are also shown. The FMS automatically generates the new legs such that the lines from the waypoint snap to the end points of whatever flight plan leg is nearest the cursor on the displayed map at any given time to thereby generate a new proposed flight plan. See Col. 2, line 61 to Col. 3, line 16. The pilot can then click an appropriate button to inform the FMS on whether to adjust the flight plan or not. See Col. 3, lines 16-29. Other persons associated with the planning of the flight, on or off the aircraft, other than the pilot are also capable of changing the flight plan. See Col. 3, lines 43-48.

The Onken '744 patent discloses a method for automatically correcting the flight of an aircraft, such as in a flight management system (FMS) used by a pilot during the flight, following a change in the flight-relevant parameters. Thus, the method permits the autonomous creation of flight plans as a reaction to, for example, air-traffic control instructions or incomplete pilot inputs. See Col. 1, lines 13-15, 33-36 and 60-63. The method includes supplying the flight plan, the flight status and environment-stipulated parameters present at the FMS to computer 1, where they are stored. The planning-relevant change inputs, such as all air-traffic control instructions, the auto-pilot inputs of the pilot and the pilot inputs for course, altitude and speed that are supplied to the FMS, are supplied to the mechanical systems of the aircraft and computer 1. Computer 1 verifies whether the change inputs necessitate a change in the flight plan or cause a discontinuity in the flight plan. Computer 1 requests navigation data as needed and flying performance data, if present, from the databases also available to the FMS.

The Onken '744 patent also describes that, in the event of a lateral discontinuity or deviation, computer 1 corrects the flight path laterally within the discontinuity with the aid of a suitable search-and-selection procedure. One search-and-selection procedure is an algorithm that searches for the most favorable flight path from a starting point to a destination point in that the flight path up to this point is expanded by new path elements. The elements are selected according to certain criteria, such as allowing segments of standard routes (not only direct connections between two path points) and/or planning the route to a fixed final approach point (not directly to the runway of the target airport), such that the route is planned as of the last reliably-known or estimatable point in the flight path. The elements are evaluated based upon the association of the respective path element with standard routes, the direction of the respective

path element relative to the direct connection between start and destination, the length of the respective path element, in relation to the status of the on-board and/or ground navigation facilities, and/or the position of the respective path element relative to detected local weather disturbances. The entire path is additionally evaluated based on the path length, and foreseeable fuel consumption. The search-and-selection procedure is ended when the optimum path has been found, a sufficiently good path has been found, no better path was found after a certain number of attempts, all possible paths are tested, or a maximum number of paths have been evaluated. Afterward, or in the event of a purely vertical discontinuity or deviation, the flight-altitude profile is corrected or re-generated at least for the region of the discontinuity or, if needed, for the entire remaining flight plan. The corrected flight plan is supplied to the FMS. See Col. 2, line 52 to Col. 4, line 32.

In contrast to the disclosures of the Pauly '171 patent and the Onken '744 patent, amended independent Claims 1 and 15 of the claimed invention are directed to the assignment of aircraft to particular routes as opposed to designing or altering an actual flight plan. Thus, the method and system of the claimed invention would, in one example, assign aircraft 1 to a route from DFW to CLT and aircraft 2 to a route from DFW to LAX, while the references describe design or editing the details of an actual flight plan between an origin and a destination. To highlight this distinction, the preambles of independent Claims 1 and 15 have been amended to recite an aircraft flight assignment method and system, respectfully.

Primarily as a result of this high level distinction, the Pauly '171 patent and the Onken '744 patent also fail to teach or suggest a number of other features of independent Claims 1 and 15, namely, that: (i) a proposed flight assignment for the aircraft is determined based on the generated aircraft routing proposal and compliance with received information describing the possible flight of the aircraft and a plurality of operational and maintenance constraints; (ii) compliance of the proposed flight assignment with a decision criterion describing requirements for aircraft routing is determined; (iii) the proposed flight assignment is optimized such that the proposed flight assignment meets the decision criterion if the decision criterion is unmet; and (iv) a flight assignment plan is generated for the aircraft using the proposed flight assignment that meets the decision criterion.

Independent Claims 1 and 15 have been further amended to clarify that the proposed flight assignment is based on not only the information used for generating the aircraft routing proposal, but also on a plurality of operational and maintenance constraints. In this regard, the maintenance constraints are limitations upon the maintenance function, such as in terms of available manpower, maintenance equipment, or the like. Similarly, the operational constraints could be, for instance, operating range, noise rating, over-water capability, or other similar constraint related to the operation of the aircraft. By taking the maintenance constraints into consideration in the flight assignment process, the method and system of the claimed invention ensure that the flight assignments do not conflict with the performance of the necessary maintenance.

The Pauly '171 patent does not teach or suggest determining a proposed flight assignment that complies with a plurality of operational and maintenance constraints. The Pauly '171 patent does not teach or suggest complying with any type of operational or maintenance constraint, as Pauly only requires the selection of a waypoint on a graphical display whereby the FMS automatically generates a new flight plan. As such, the Pauly '171 patent does not determine a proposed flight assignment based on operational and maintenance constraints, as Pauly is directed to flight planning rather than determining a flight assignment for the aircraft based on the constraints, as noted above. Similarly, the Onken '744 patent does not determine whether the proposed flight assignment meets a plurality of operational and maintenance constraints, as recited by independent Claims 1 and 15. In fact, the Onken '744 patent does not disclose operational or maintenance constraints at all, as the FMS automatically generates a flight plan based on discontinuities in planning-relevant change inputs (*e.g.*, air-traffic control instructions, altitude and speed). Thus, as noted above, the Onken '744 patent, like the Pauly '171 patent, is more concerned with flight planning, rather than determining a proposed flight assignment based on operational and maintenance constraints before any discontinuity or irregularity occurs.

As to the other references cited by the Official Action with respect to independent Claims 1 and 15, U.S. Patent No. 5,657,231 to Nobe et al. discloses a route setting method and apparatus and an associated navigation system; again in marked contrast to the flight or tail assignment

method and system of independent Claims 1 and 15. The route setting method is used to obtain the shortest route from a starting position to a destination position. U.S. Patent No. 6,216,109 to Zweben et al. discloses iterative repair optimization with particular application to scheduling for integrated capacity and inventory planning. A system and method are disclosed for scheduling a complex activity that includes performance of many tasks, which requires many resources and adherence to state requirements of a multiplicity of attributes. The system and method of the Zweben '109 patent combine the techniques of constraint-based iterative repair with the techniques of material requirements planning.

However, these additional references share the same shortcomings as Pauly and Onken in that these additional references, taken either individually or in combination with Pauly and/or Onken, likewise fail to teach or suggest determining a proposed flight assignment based on a plurality of operational and maintenance constraints, as recited by independent Claims 1 and 15. The Nobe '231 patent does not teach or suggest using operational or maintenance constraints for its navigation system, and the Zweben '109 patent does not disclose a proposed flight assignment, let alone a proposed flight assignment that complies with a plurality of operational and maintenance constraints. Zweben addresses scheduling various tasks including maintenance and repair of an aircraft, such as scheduling the activities of technicians and engineers, as well as the use of repair tools and replacement parts. In contrast, Claims 1 and 15 of the present application recite a proposed flight assignment and flight assignment plan that are directed to scheduling and tail assignment of the aircraft for maintenance, rather than scheduling the specific tasks involved in maintaining the aircraft.

Even if the references were combined, the combination would not teach or suggest any type of flight or tail assignment method and system as recited by amended independent Claims 1 and 15. Moreover, even if any two or more of the cited references were combined, the combined references would not teach or suggest that: (i) a proposed flight assignment for the aircraft is determined based on the generated aircraft routing proposal and compliance with received information describing the possible flight of the aircraft and a plurality of operational and maintenance constraints; (ii) compliance of the proposed flight assignment with a decision criterion describing requirements for aircraft routing is determined; (iii) the proposed flight

assignment is optimized such that the proposed flight assignment meets the decision criterion if the decision criterion is unmet; and (iv) a flight assignment plan is generated for the aircraft using the proposed flight assignment that meets the decision criterion, as recited by amended independent Claims 1 and 15.

B. The Rejections of Claims 29, 32, 34, 35 and 38 under 35 U.S.C. § 103(a) are Overcome

Amended independent Claims 29 and 35 recite that: (i) a flight network is generated from received information that describes a possible flight of an aircraft, which includes maintenance and operational constraints that are tail specific; (ii) a flight network is generated for the aircraft from the received information, (iii) at least one of the maintenance and operational constraints are modeled; and (iv) an aircraft routing proposal is determined for the aircraft that satisfies the received information. Thus, the method and system of Claims 29 and 35 determine possible flights for the aircraft that satisfy all prescribed maintenance and operational constraints in the received information. In one embodiment of the present application, a processor may model all maintenance and operational constraints as reflected in the received information in each individual aircraft's flight network thereby enabling tail specific constraints to be considered. The processor could treat each flight network as a sub-problem to be solved by an algorithm.

The Aslin '919 patent describes an onboard central maintenance computer system (CMCS) integrated into an aircraft system and a system for collecting and analyzing complete maintenance information. The CMCS collects, consolidates and reports line replaceable unit (LRU) fault data in order to aid flight crew and maintenance personnel in maintenance procedures. See Abstract. As shown in Figures 1 and 2, an indirect data bus 42 of the communications system 16 couples the CMC 12 to the integrated display system (IDS) 36 so that the CMC receives air data computer (ADC) fault data. The direct data bus 44 of the communications system 16 couples the CMC directly to non-built in test equipment (BITE) LRUs, such as the wing anti-ice LRU 48. See Col. 9, lines 47-63. The IDS 36 collects and processes fault data from computerized control systems 40 connected to the engine indicating and crew alerting system (EICAS) and the electronic flight instrument system (EFIS). The

EICAS provides primary caution, warning and status condition display indications to the flight crew and the EFIS provides the primary navigation data display including attitude, altitude, course, etc. The IDS 36 displays information, such as primary flight, navigation, EICAS messages, etc. on an integrated display unit (IDU) 56. The dedicated displays of the IDU 56 are used by the IDS to annunciate system observations to the flight crew. The type of LRU fault data collected at the IDS is data indicative of situations that require crew awareness, i.e., flight deck annunciation, or that affect dispatchability. See Col. 10, line 65 to Col. 11, line 24. Fault data is detected while the aircraft is in flight. See Col. 11, lines 50-51. Most of the fault data collected via the direct data bus 44 is in an analog discrete format with signals indicative of characteristics such as switch position, valve position, voltage level, etc. The values of the analog discrete signals can be mapped to binary values and packed into digital words that are presented on the respective displays of the IDU 56. The analog discrete fault data is then analyzed by the CMC in the same manner as the digital fault data collected from the EICAS and the EFIS. See Col. 12, lines 11-49.

Although the Aslin '919 patent describes collecting and processing fault data from computerized control systems indicative of situations that require crew awareness, *i.e.*, flight deck annunciation, or that affect dispatchability and mapping any analog discrete signals to binary values, the Aslin '919 patent does not teach generating an aircraft routing proposal by generating a flight network from information that describes a possible flight of an aircraft, which includes maintenance and operational constraints that are tail specific, and/or modeling at least one of the maintenance and operational constraints, as recited by independent Claims 29 and 35. The Official Actions refers to the abstract of the Aslin '919 patent for the proposition that "the LRU fault data is considered to be the operational constraint," and column 11 for disclosing the generation of a flight network from the received information. However, the LRU fault data is used to determine specific components (*e.g.*, valve or pump) that need replacing, while the operational constraints of the present application (*e.g.*., range, noise rating, over water) are directed to the actual operation of the aircraft rather than specific individual components. In addition, the Aslin '919 patent only discloses collecting and processing fault data from computerized control systems, it does not teach generating a flight network from information that

describes a possible flight of an aircraft, where the flight network may represent an airline schedule for a particular aircraft (*i.e.*, aircraft 1 to fly from DFW to CLT to CHI and aircraft 2 to fly from DFW to LAW to DFW). See Specification, paragraph 29. The Aslin '919 patent is primarily concerned with aiding flight crew and maintenance personnel in maintenance procedures by isolating faults to determine particular components that need repaired or replaced. As such, the Aslin '919 patent discloses the collection of fault data for maintenance purposes but does not generate a flight network based on any maintenance and operational constraints or otherwise.

Furthermore, the Official Action cites to column 12, lines 33-49 of the Aslin '919 patent, which generally states that analog discrete signals may be mapped to binary values, but this does not teach modeling at least one of the maintenance and operational constraints from information that describes a possible flight of an aircraft, as recited by independent Claims 29 and 35. Modeling the maintenance and/or operational constraints that are received in the information describing a possible flight of an aircraft permits the determination of a routing proposal that satisfies the received information, such as via the various algorithms disclosed in the specification, which is a very different concept than simply mapping or converting analog discrete signals to binary values.

In addition, the Onken '744 patent automatically creates revised flight plans to supply to the FMS, but the Onken '744 patent does not disclose generating the revised flight plan by generating a flight network from information that describes a possible flight of an aircraft, which includes maintenance and operational constraints that are tail specific; modeling at least one of the maintenance and operational constraints; and determining an aircraft routing proposal for the aircraft that satisfies the received information, as recited by independent Claims 29 and 35. Although the Onken '744 patent may create the revised flight plan by using a search-and-selection procedure to search for the most favorable flight path from a starting point to a destination point by expanding the flight path by new path elements that are selected according to certain criteria, such as allowing segments of standard routes (not only direct connections between two path points) and/or planning the route to a fixed final approach point (not directly to the runway of the target airport), the Onken '744 patent does not generate the revised flight plan

by generating a flight network that includes maintenance and operational constraints, as recited by independent Claims 29 and 35. In addition, the Onken '744 patent does not describe modeling the maintenance and/or operational constraints, and then determining an aircraft routing proposal, as also recited by independent Claims 29 and 35. It follows that the Onken '744 patent also does not disclose determining an aircraft routing proposal for the aircraft that satisfies the received information, which is contrary to the finding in the Official Action.

The remaining references, including the Pauly '171 patent, the Nobe '231 patent, and Zweben '109 patent, also do not teach or suggest receiving information describing a possible flight of an aircraft, generating a flight network from the received information, modeling at least one maintenance and operational constraint, and determining an aircraft routing proposal for the aircraft satisfying the received information. In fact, the Pauly '171, Nobe '231, and Zweben '109 patents do not disclose receiving information including both maintenance and operational constraints describing a flight of an aircraft, let alone generating a flight network based on the information and modeling at least one of the maintenance and operational constraints.

Therefore, none of the references, alone or in combination, teach or suggest that: (i) a flight network is generated from received information that describes a possible flight of an aircraft, which includes maintenance and operational constraints that are tail specific; (ii) a flight network is generated for the aircraft from the received information, (iii) at least one of the maintenance and operational constraints are modeled; and (iv) an aircraft routing proposal is determined for the aircraft that satisfies the received information, as recited by independent Claims 29 and 35.

Accordingly, none of the references, taken either individually or in combination, teach or suggest the methods or systems for aircraft routing of independent Claims 1, 15, 29, and 35. Since the independent claims are patentably distinct from the cited references, taken either individually or in combination, the claims that depend therefrom are also patentably distinct from the cited references for at least the same reasons since the dependent claims include each of the elements of a respective independent claim. Consequently, Applicants submit that, for at least those reasons set forth above, the rejections of the claims under 35 U.S.C. § 103(a) are therefore also overcome.

Consideration Of Previously Submitted Information Disclosure Statement

It is noted that an initialed copy of the PTO Form 1449 that was submitted with Applicants' Information Disclosure Statement mailed August 26, 2004 has not been returned to Applicants' representative. Accordingly, it is requested that an initialed copy of the Form 1449 be forwarded to the undersigned with the next communication from the PTO. In order to facilitate review of the reference by the Examiner, a copy of reference, the Information Disclosure Statement, and the Form 1449 are attached hereto.

CONCLUSION

In view of the amendments and the remarks presented above, it is respectfully submitted that all of the present claims of the present application are in condition for immediate allowance. It is therefore respectfully requested that a Notice of Allowance be issued. The Examiner is encouraged to contact Applicants' undersigned attorney to resolve any remaining issues in order to expedite examination of the present application.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,

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"Express Mail" mailing label number EV 440825608 US
Date of Deposit October 7, 2004

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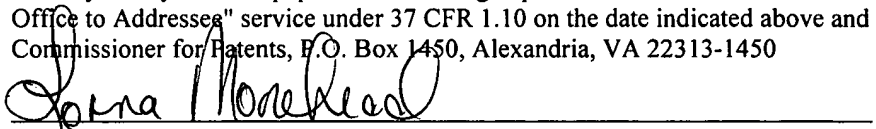

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